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10/080,915	02/22/2002	Randy Harris	291958173US1	7799

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EXAMINER	
WILKINS III, HARRY D	

ART UNIT	PAPER NUMBER
1742	

DATE MAILED: 04/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/080,915	HARRIS ET AL.	
	Examiner	Art Unit	
	Harry D. Wilkins, III	1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 March 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32 and 57-62* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32 and 57-62* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 February 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 12, 13, 16, 17, 21, 25, 28 and 57-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harada et al (US 5,700,127) in view of van Doren et al (US 5,700,046).

Harada et al teach (see figure 1) an apparatus for processing microelectronic workpieces including a plurality of processing stations (34 - 39), an input/output station (2) configured to support at least one microelectronic workpiece for automatic transfer to and from the processing stations, and a transfer device (10) positioned proximate to the input/output station and the processing stations, wherein the transfer device was automatically movable transfer microelectronic workpieces between the input/output station and the processing stations, the transfer device being positioned to release the microelectronic workpieces for processing at the processing stations.

Thus, Harada et al fail to teach that the transfer device included first and second end effectors, each being rotatable relative to the other about a common axis.

Van Doren et al teach (see figure 1) a dual end effector wafer transport mechanism containing two end effectors each being rotatable relative to each other

about a common axis. The dual end effector has the advantage of increasing transport mechanism throughput, thereby speeding microelectronic workpiece processing.

Therefore, it would have been obvious to one of ordinary skill in the art to have used the dual end effector as taught by van Doren et al in the apparatus of Harada et al because the dual end effector increased microelectronic workpiece processing speed.

Regarding claims 21 and 28, Harada et al further teach (see paragraph spanning cols. 4 and 5) that the processing stations include at least one station configured to remove material from the microelectronic workpiece and at least one station configured to heat (bake) the microelectronic workpiece. The baking unit would inherently be considered to include a heat transfer unit proximate to the thermal processing space to elevate the temperature of the microelectronic workpiece.

Regarding claim 12, Harada et al do not expressly disclose that the apparatus includes an enclosure around the processing stations for restricting user access to the transfer device. However, it was conventional in the art to conduct microelectronic processing in a clean room environment (see e.g.-Curtis et al) in order to prevent dust and other impurities from affecting the workpiece surface. Therefore, it would have been obvious to one of ordinary skill in the art to have added an enclosure for closing off the area surrounding the processing stations so that the processing stations could be operated in a clean room environment.

Regarding claims 13 and 25, the processing stations of Harada et al were (see figure 1) arranged along a first line and the transfer device included a robot moving along a second line parallel to the first line. Harada et al do not expressly disclose that

the apparatus includes an enclosure around the processing stations for restricting user access to the transfer device. However, it was conventional in the art to conduct microelectronic processing in a clean room environment (see e.g.-Curtis et al) in order to prevent dust and other impurities from affecting the workpiece surface. Therefore, it would have been obvious to one of ordinary skill in the art to have added an enclosure for closing off the area surrounding the processing stations so that the processing stations could be operated in a clean room environment. Since the robot transfer device would need access to the input/output station, the enclosure would have an aperture accessible to the robot. It would have been obvious to one of ordinary skill in the art to have made each of the stations manually accessible because it would have been necessary to be able to perform maintenance on the processing stations. Thus, it would have been desirable to have added a second closable aperture to provide manual access to the processing stations.

Regarding claims 16, 17 and 27, Harada et al do not expressly disclose that the apparatus includes an enclosure around the processing stations for restricting user access to the transfer device. However, it was conventional in the art to conduct microelectronic processing in a clean room environment (see e.g.-Curtis et al) in order to prevent dust and other impurities from affecting the workpiece surface. Therefore, it would have been obvious to one of ordinary skill in the art to have added an enclosure for closing off the area surrounding the processing stations so that the processing stations could be operated in a clean room environment. It would have been obvious to one of ordinary skill in the art to have made each of the stations manually accessible

because it would have been necessary to be able to perform maintenance on the processing stations. Thus, it would have been desirable to have added closable apertures to provide manual access to the processing stations on either side of the apparatus. The other two sides of the apparatus would not require apertures for accessing the processing stations since adequate access would have been provided on the first two sides.

Regarding claim 57, Harada et al further teach (see paragraph spanning cols. 4 and 5) that the processing stations include at least one station configured to apply material to the microelectronic workpiece.

Regarding claim 58, the transfer devices of both Harada et al and van Doren et al included a robot having a projection. The projection of van Doren et al carried the first and second end effectors and the effectors were rotatable relative to the projection about a common axis. Van Doren et al teach that the projection was "eccentric" in shape.

Regarding claim 59, the transfer device of van Doren et al included a lift positioned to move up and down, an "arm" carried by the lift being rotatable relative to the lift around a vertical axis, wherein the first and second end effector were both carried by the "arm" and were rotatable relative to a common axis.

Regarding claim 60, the apparatus of Harada et al included (see figure 2) processing stations at a first plane and a transfer device including a moveable robot in a second plane located below the first plane.

3. Claims 2-5, 7, 9-11, 18-20, 22, 23 and 29-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harada et al (US 5,700,127) in view of van Doren et al (US 5,700,046) as applied to claims above and further in view of Applicant's admission of prior art.

The teachings of Harada et al and van Doren et al are described above.

(All references to paragraph numbers in the present application come from the PGPub of this application, 2003/0159921).

Harada et al teach (see paragraph spanning cols. 4 and 5) that the processing stations are conventional in the art for processing the microelectronic workpieces.

Hence, Harada et al does not teach the details of the conventional processing stations.

However, Applicant admits as prior art (see paragraphs 81, 89, 96, 105, 110, 121 and 134) that certain aspects of the processing stations were known in the prior art from various disclosed references. This subject matter corresponds to the inventions shown in Figures 9, 12-14, 16 and 18. Each of these conventional processing stations corresponds to claims 2-5, 7 and 9-11.

Therefore, it would have been obvious to one of ordinary skill in the art to have adapted the apparatus of Thompson et al to use the conventional processing stations disclosed by Applicant because the conventional processing stations allow any desirable process to be carried out upon the semiconductor wafers, such as electroplating, removal of material, metrology (testing of certain properties) and thermal processing.

Regarding claim 18, Harada et al teach (see paragraph spanning cols. 4 and 5) the apparatus included a (jet) spray station as claimed. Harada et al do not teach the details of adding an electrodeposition station as claimed. However, Applicant admits that such an electrodeposition station was known in the prior art (see paragraph 105). Therefore, it would have been obvious to one of ordinary skill in the art to have adapted the apparatus of Harada et al to have used the conventional processing station disclosed by Applicant because the conventional processing station allowed any desirable process to be carried out upon the semiconductor wafers, such as electroplating.

Regarding claim 19, it would have been obvious to one of ordinary skill in the art to have adapted the apparatus of Harada et al to use the conventional processing stations disclosed by Applicant because the conventional processing stations allow any desirable process to be carried out upon the semiconductor wafers, such as electroplating (to enhance seed layer and to apply a blanket layer), removal of material and thermal processing.

Regarding claim 20, as above, the apparatus of Harada et al includes a (jet) spray station as claimed. It would have been obvious to one of ordinary skill in the art to have adapted the apparatus of Harada et al to have used the conventional processing stations disclosed by Applicant because the conventional processing stations allow any desirable process to be carried out upon the semiconductor wafers, such as electrophoretic deposition and thermal processing.

Regarding claims 22 and 23, the admitted prior art material removing station meets all of the claimed structural limitations. It would have been obvious to one of ordinary skill in the art to have adapted the apparatus of Harada et al to have used the conventional processing stations disclosed by Applicant because the conventional processing stations allow any desirable process to be carried out upon the semiconductor wafers, such as removal of material.

Regarding claims 29 and 30, Harada et al fail to teach the specific details of the thermal processing station as claimed. However, the details of the thermal processing station were admitted by Applicant to be prior art (see paragraph 134). Therefore, the prior art meets the claimed structural limitations.

Regarding claim 31, the processing stations of Harada et al were (see figure 1) arranged along a first line and the transfer device included a robot moving along a second line parallel to the first line. Harada et al do not expressly disclose that the apparatus includes an enclosure around the processing stations for restricting user access to the transfer device. However, it was conventional in the art to conduct microelectronic processing in a clean room environment (see e.g.-Curtis et al) in order to prevent dust and other impurities from affecting the workpiece surface. Therefore, it would have been obvious to one of ordinary skill in the art to have added an enclosure for closing off the area surrounding the processing stations so that the processing stations could be operated in a clean room environment. Since the robot transfer device would need access to the input/output station, the enclosure would have an aperture accessible to the robot. It would have been obvious to one of ordinary skill in

the art to have made each of the stations manually accessible because it would have been necessary to be able to perform maintenance on the processing stations. Thus, it would have been desirable to have added a second closable aperture to provide manual access to the processing stations.

Regarding claim 32, Harada et al do not expressly disclose that the apparatus includes an enclosure around the processing stations for restricting user access to the transfer device. However, it was conventional in the art to conduct microelectronic processing in a clean room environment (see e.g.-Curtis et al) in order to prevent dust and other impurities from affecting the workpiece surface. Therefore, it would have been obvious to one of ordinary skill in the art to have added an enclosure for closing off the area surrounding the processing stations so that the processing stations could be operated in a clean room environment. It would have been obvious to one of ordinary skill in the art to have made each of the stations manually accessible because it would have been necessary to be able to perform maintenance on the processing stations. Thus, it would have been desirable to have added closable apertures to provide manual access to the processing stations on either side of the apparatus.

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harada et al (US 5,700,127) in view of van Doren et al (US 5,700,046) as applied to claims above and further in view of Bacon et al (US 4,466,864).

The teachings of Harada et al and van Doren et al are described above.

Harada et al teach (see paragraph spanning cols. 4 and 5) that the processing stations other than the disclosed reactor are conventional in the art for applying complementary processing steps on the microelectronic workpieces.

Hence, Harada et al does not teach the details of a conventional processing station being an electroless plating station.

However, Bacon et al teach (see abstract, figures 2 and 3) an plating station for a semiconductor wafer (31) including a first vessel configured to provide a fluid and a weir (overflow dam (54)) positioned to define a level of the fluid, a second vessel (56) disposed around the first vessel to receive the fluid flowing over the weir, a support (38) positioned to carry the wafer into contact with the fluid and a reservoir (58) configured to carry the fluid.

Therefore, it would have been obvious to one of ordinary skill in the art to have adapted the apparatus of Harada et al to use the conventional processing station of Bacon et al because the processing station allowed easy plating of semiconductor wafers with repeatability and easy access.

5. Claims 8 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harada et al (US 5,700,127) in view of van Doren et al (US 5,700,046) as applied to claims above and further in view of Thompson et al (US 5,168,886).

The teachings of Harada et al and van Doren et al are described above.

Harada et al teach (see paragraph spanning cols. 4 and 5) that the processing stations other than the disclosed reactor are conventional in the art for applying complementary processing steps on the microelectronic workpieces.

Hence, Harada et al does not teach the details of a conventional processing station being a spray station with a fluid manifold.

However, Thompson et al teach (see figures 4-5 and related description at col. 3, lines 8-41) a station that included a vessel (not shown) configured to store a liquid, a support configured to carry the wafer and a fluid manifold being coupled to the vessel and having a plurality of fluid jets directed toward the support to spray the wafer with the fluid.

Therefore, it would have been obvious to one of ordinary skill in the art to have adapted the apparatus of Harada et al to use the conventional spray station of Thompson et al because the spray station of Thompson et al was an economic improvement over prior spray stations by processing a single wafer at a time.

6. Claims 14 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harada et al (US 5,700,127) in view of van Doren et al (US 5,700,046) as applied to claims above and further in view of Ono et al (US 5,378,145).

The teachings of Harada et al and van Doren et al are described above.

Harada et al teach (see figure 1) the apparatus substantially as claimed.

Regarding claim 14, Harada et al teach the processing stations are disposed on either side of the robotic transfer device.

Ono et al teach (see figure 1) arranging processing stations in a single line to one side of a robotic transfer device.

Therefore, it would have been obvious to one of ordinary skill in the art to have made the apparatus of Harada et al to have the processing stations in a single line to

one side of the robotic transfer device of Harada et al so that the apparatus could be placed along a wall in order to maximize floor space in the processing room.

In addition, it would have been obvious to one of ordinary skill in the art to have made the processing stations manually accessible as taught by Ono et al (antistatic door 124) from a single side so that the processing stations could be accessed for maintenance.

7. Claims 15 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harada et al (US 5,700,127) in view of van Doren et al (US 5,700,046) as applied to claims 57 and 21 above and further in view of Zila et al (US 5,731,678).

The teachings of Harada et al and van Doren et al are described above.

Harada et al teach (see figure 1) the apparatus substantially as claimed.

However, Harada et al do not teach the processing stations had a support positioned proximate to the processing station having two transferring positions, one to receive the workpiece from the transfer device and the other to receive the workpiece manually.

Zila et al teach (see figures and col. 15, lines 22-25) a support for a processing station that had two transferring positions, the first being for accepting the workpiece from a robot and the second being for accepting the workpiece manually.

Therefore, it would have been obvious to one of ordinary skill in the art to have made the apparatus of Harada et al to have the workpiece support of Zila et al at the processing stations so that the workpieces could be manually accessed.

8. Claim 62 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harada et al (US 5,700,127) in view of van Doren et al (US 5,700,046) and Ono et al (US 5,378,145) as applied to claim 61 above and further in view of Zila et al (US 5,731,678).

The teachings of Harada et al, van Doren et al and Ono et al are described above.

Harada et al teach (see figure 1) the apparatus substantially as claimed.

However, Harada et al do not teach the processing stations had a support positioned proximate to the processing station having two transferring positions, one to receive the workpiece from the transfer device and the other to receive the workpiece manually.

Zila et al teach (see figures and col. 15, lines 22-25) a support for a processing station that had two transferring positions, the first being for accepting the workpiece from a robot and the second being for accepting the workpiece manually.

Therefore, it would have been obvious to one of ordinary skill in the art to have made the apparatus of Harada et al to have the workpiece support of Zila et al at the processing stations so that the workpieces could be manually accessed.

Response to Arguments

9. Applicant's arguments filed 20 March 2006 have been fully considered but they are not persuasive. Applicant has argued that

a. The combination of Harada et al with van Doren et al requires improper hindsight.

In response, the Examiner totally disagrees. Given the disclosure of van Doren et al, one of ordinary skill in the art would have been well aware of the advantages of using two grippers instead of a single gripper, particularly that multiple (two) wafers could be moved at the same time, thereby improving apparatus throughput. This does not require hindsight since it naturally flows from the disclosure of van Doren et al.

b. Ono et al do not teach that each of the processing stations are manually accessible.

In response, each of the processing stations of Ono et al would be considered manually accessible from a single side of the apparatus through doors 142 and 301. Nothing in the claims as written require "easy" manual access, merely that the processing stations are manually accessible. The structure shown by Ono et al included a plurality of processing stations each accessible by both a robotic transfer device and manually by an operator. Further, the manually accessible "spot" of the processing station is considered to be at the location just inside opening 311 since anything within the box 310 would be considered the processing station.

The Examiner would also like to clarify the record with respect to claims 15, 26 and 62. The disclosed positioning of the workpiece support is best exemplified in figure 2 of the present application. The support 160 is movable along the axis "B" from a low position below shield 134 to accept transfer of a workpiece form the transfer robot 131 and to a position above shield 134 to accept a workpiece manually through an opening above shield 134. However, the claims as written, do not require all of the details of the disclosed drawing. The workpiece support of Zila et al was pivotable about axes 411

and 412 to a plurality of positions. The workpiece support was capable of being at two different positions, the first being accessible from a robot and a second accessible manually. Thus, the workpiece support of Zila et al was capable of operating in the claimed fashion, regardless of the fact that in the case of Zila et al the workpiece support would have been accessible to a transfer robot or manually at any of the positions.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D. Wilkins, III whose telephone number is 571-272-1251. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Harry D Wilkins, III
Primary Examiner
Art Unit 1742

hdw